Propellant - RP

Identity

Name: RP
Source: Alan Yates

Composition

percent	parts	component
62.07%	18	Potassium Nitrate
20.69%	6	Charcoal (airfloat)
10.34%	3	Sulfur
6.90%	2	Aluminium (-325 mesh, spherical)

Required Mass calculate

Preperation

All the chemicals except the Aluminium are ball milled for at least 2 hours. The Aluminium is then screened in using a 60 mesh screen.

The meal may be used as-is, but it is preferable to moisten with a 25% solution of alcohol, knead and force through a 20 mesh screen to granulate it. This granulation procedure makes it much easier to work with while loading into cases and also makes is somewhat more powerful.

Comments

The spherical Aluminium is not for effect, but it rather a phlegmatizer. It does produce an interesting tail effect which is probably a glitter related reaction despite the fairly low sulfur content. This propellant is specially designed for my 3/8" ID core-burning motors.

The glitter effect is curious, and appears to be related to the velocity that dross droplets are ejected, there are two ranges over which glitter is observed, outside these delayless silver Al burning or nothing but blackbody radiation is observed. Possibly a question of droplet size and oxygen availability or stripping and ablative cooling of the sulfide melt layer at excessive velocities.

If the granulated composition is charged into a thin lance (~ 5 mm) and burnt at arms length it forms quite a nice effect, albeit a short duration one due to the relatively high burning speed of the composition. Slower compositions would tend to just clog with dross, but something similar might be achieved using a D1-like composition as microstars in a propellant matrix.

Dan Creagan suggests replacing the spherical Al 1 for 1 with Ti flake. I haven't tried this yet, but I'd imagine the higher burning temperature would make the propellant a little more energetic. The effect would definitely be improved. FeTi might be quite interesting too, something similar to blonde streamer perhaps? His RPH is interesting as well, it would be nice to have a RP-like composition that did not require milling, appearing hotter than the 6:2:1-esk RP it may be suitable for short core-burners with minimal processing.

If you are looking for a "just works" rocket propellant I highly recommend you start with 6:3:1 greenmix. It is far more forgiving than RP, and in general is much less hassle to prepare and tune to conventional core-burning geometries.

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